

## **Qualitative assessment of soil carbon in a rehabilitated forest using Fourier transform infrared spectroscopy.**

### **ABSTRACT**

Logging and poor shifting cultivation negatively affect initial soil carbon (C) storage, especially at the initial stage of deforestation, as these practices lead to global warming. As a result, an afforestation program is needed to mitigate this problem. This study assessed initial soil C buildup of rehabilitated forests using Fourier transform infrared (FTIR) spectroscopy. The relatively high E4/E6 values of humic acids (HAs) in the rehabilitated forest indicate prominence of aliphatic components, suggesting that the HAs were of low molecular weight. The total acidity, carboxylic (-COOH) and phenolic (-OH) of the rehabilitated forest were found to be consistent with the ranges reported by other researchers. The spectra of all locations were similar because there was no significant difference in the quantities of C in humic acids (CHA) regardless of forest age and soil depth. The spectra showed distinct absorbance at 3290, 1720, 1630, 1510, 1460, 1380, and 1270 cm<sup>-1</sup>. Increase of band at 1630 and 1510 cm<sup>-1</sup> from 0-20 to 40-60 cm were observed, suggesting C buildup from the lowest depths 20-40 and 40-60 cm. However, the CHA content in the soil depths was not different. The band at 1630 cm<sup>-1</sup> was assigned to carboxylic and aromatic groups. Increase in peak intensity at 1510 cm<sup>-1</sup> was because C/N ratio increased with increasing soil depth. This indicates that decomposition rate decreased with increasing soil depth and decreased with CHA. The finding suggests that FTIR spectroscopy enables the assessment of C composition functional group buildup at different depths and ages.

**Keyword:** Soil carbon; Carbon buildup; FTIR; Carbon in humic acids; Rehabilitated.